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पॉवर ट्राँसफार्मरों, पॉवर आपूर्ति इकाईयों और ऐसी इकाईयों की सुरक्षा

भाग 2 विशिष्ट अपेक्षाएँ

अनुभाग 6 सामान्य उपयोग हेतु सुरक्षा विलग्नकारी ट्राँसफार्मर

Indian Standard

SAFETY OF POWER TRANSFORMERS, POWER SUPPLY UNITS AND SIMILAR

PART 2 PARTICULAR REQUIREMENTS

Section 6 Safety Isolating Transformers for General Use

ICS 29.180

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

April 2008

Price Group 4

Transformers Sectional Committee, ETD 16

NATIONAL FOREWORD

This Indian Standard (Part 2/Sec 6) which is identical with IEC 61558-2-6 : 1997 'Safety of power transformers, power supply units and similar — Part 2: Particular requirements for safety isolating transformers for general use' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Transformers Sectional Committee and approval of the Electrotechnical Division Council.

The text of IEC Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker, while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

Only the English text of the International Standard has been retained while adopting it as an Indian Standard, and as such the page numbers given here are not the same as in the IEC Publication.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be same as that of the specified value in this standard.

Indian Standard

SAFETY OF POWER TRANSFORMERS, POWER SUPPLY UNITS AND SIMILAR

PART 2 PARTICULAR REQUIREMENTS

Section 6 Safety Isolating Transformers for General Use

1 Scope

Replacement:

This part 2 of IEC 61558 applies to stationary or portable, single-phase or polyphase, air-cooled **safety isolating transformers**, associated or otherwise, having a **rated supply voltage** not exceeding 1000 V a.c. and **rated frequency** not exceeding 500 Hz, the **rated output** not exceeding:

- 10 kVA for single-phase transformers;
- 16 kVA for polyphase transformers.

This standard is also applicable to **safety isolating transformers** without limitation of the ***rated output***; however such transformers are considered as special transformers and are subjected to an agreement between the purchaser and the supplier.

The **no-load output voltage** and the **rated output voltage** does not exceed:

50 V a.c. r.m.s. and/or
120 V ripple-free d.c.

between conductors or between any conductor and earth.

This standard is applicable to **dry type transformers**. The windings may be encapsulated or non-encapsulated.

2 Normative references

This clause of part 1 is applicable.

3 Definitions

This clause of part 1 is applicable.

4 General requirements

This clause of part 1 is applicable.

5 General notes on tests

This clause of part 1 is applicable.

6 Ratings

This clause of part 1 is applicable except as follows:

Addition:

6.101 The **rated output voltage** shall not exceed 50 V a.c. and/or 120 V ripple-free d.c.

For a.c. the preferred values for the **rated output voltage** are: 6 V, 12 V, 24 V, 42 V and 48 V.

6.102 The **rated output** shall not exceed 10 kVA for single-phase transformers and 16 kVA for polyphase transformers except for special safety isolating transformers.

Preferred values for the rated output are:

- 25 VA, 40 VA, 63 VA, 100 VA, 160 VA, 250 VA, 400 VA, 630 VA, 1000 VA, 1600 VA, 2500 VA, 4000 VA, 6300 VA, 10 000 VA for single-phase transformers;
- 630 VA, 1000 VA, 1600 VA, 2500 VA, 4000 VA, 6300 VA, 10 000 VA and 16 000 VA for polyphase transformers.

6.103 The **rated frequency** shall not exceed 500 Hz.

6.104 The **rated supply voltage** shall not exceed 1000 V a.c.

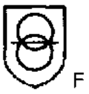
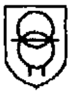
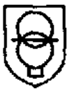
7 Classification

This clause of part 1 is applicable.

8 Marking and other information

This clause of part 1 is applicable except as follows:

8.11 *Addition:*

	**Fail-safe safety isolating transformer**
	**Non-short-circuit-proof safety isolating transformer**
	**Short-circuit-proof safety isolating transformer** (inherently or non-inherently)

Addition:

8.101 For transformers intended for connection to the supply by means of a cable or cord and a plug, an instruction sheet or the like shall be delivered with the transformer, drawing the attention of the user to the fact that the output circuit(s) shall be installed and protected in accordance with national wiring rules.

9 Protection against accessibility to hazardous live parts

This clause of part 1 is applicable except as follows:

9.2 *Addition before the first paragraph:*

Live parts at **no-load output voltage** not exceeding 35 V peak a.c. or 60 V ripple-free d.c. may be accessible.

Addition of the following new text after the second dash:

- parts giving access to **live parts** which are normally connected to an output circuit, which due to the nature of its use, is accessible, provided that, for **no-load output voltages** exceeding 35 V peak a.c. or 60 V ripple-free d.c. only one pole becomes accessible.

10 Change of input voltage setting

This clause of part 1 is applicable except as follows:

Addition:

10.101 **Portable transformers** shall have only *one* **rated supply voltage** unless the transformer is not capable of producing an output voltage in excess of the limits allowed in the scope if the higher marked voltage is accidentally connected to the lower voltage winding.

NOTE – For the purpose of this requirement, a **portable transformer** provided with a device for adjusting the input connections to suit supply voltages over a range of not more than 10 % of the value corresponding with the midpoint of that range, is not considered to be a transformer with more than one supply voltage.

11 Output voltage and output current under load

This clause of part 1 is applicable.

12 No-load output voltage

This clause of part 1 is applicable except as follows:

Addition:

12.101 The **no-load output voltage** shall not exceed 50 V a.c. and on 120 V ripple-free d.c. under any circumstances even when independent output windings which are not intended to be connected in series are connected in series.

12.102 The difference between the **output voltages** at **no-load** and **at rated output** shall not be excessive.

*Compliance with the requirements of 12.101 and 12.102 is checked by measuring the **no-load output voltage**, when the transformer, at **ambient temperature**, is connected to the **rated supply voltage** at **rated frequency**.*

The difference between the value measured and the output voltage measured during the test of clause 11, expressed as a percentage of the latter voltage, shall not exceed the value shown in table 101.

NOTE – The ratio is defined as follows:

$$\frac{U_{\text{no-load}} - U_{\text{load}}}{U_{\text{load}}} \times 100$$

Table 101 – Output voltage deviation

Type of transformer	Ratio between output voltage at no-load and at rated output %
Inherently short-circuit proof transformers:	
– up to and including 63 VA	100
– over 63 VA up to and including 630 VA	50
– over 630 VA	20
Other transformers:	
– up to and including 10 VA	100
– over 10 VA up to and including 25 VA	50
– over 25 VA up to and including 63 VA	20
– over 63 VA up to and including 250 VA	15
– over 250 VA up to and including 630 VA	10
– over 630 VA	5

13 Short-circuit voltage

This clause of part 1 is applicable.

14 Heating

This clause of part 1 is applicable.

15 Short-circuit and overload protection

This clause of part 1 is applicable.

16 Mechanical strength

This clause of part 1 is applicable.

17 Protection against harmful ingress of dust, solid objects and moisture

This clause of part 1 is applicable.

18 Insulation resistance and dielectric strength

This clause of part 1 is applicable.

19 Construction

This clause of part 1 is applicable except as follows:

Replacement:

19.1 The input and output circuits shall be electrically separated from each other, and the construction shall be such that there is no possibility of any connection between these circuits, either directly or indirectly, through other metal parts.

Compliance is checked by inspection, taking clauses 18, 19 and 26 into consideration.

19.1.1 The insulation between the input and output winding(s) shall consist of **double** or **reinforced insulation**, unless the requirements of 19.1.3 are complied with.

In addition, the following applies:

- for **class I transformers**, the insulation between the input windings and the body shall consist of basic insulation, and the insulation between the output windings and the body shall consist of **supplementary insulation**;
- **for class II transformers,** the insulation between the input windings and the body, and between the output windings and the body, shall consist of **double** or **reinforced insulation**.

19.1.2 For **class I transformers** where an intermediate metal part (e.g. the iron core), not connected to the body, is located between the input and output windings, the insulation between the input and output windings via the intermediate metal part shall consist of **double** or **reinforced insulation**, and, for class II transformers, the insulation between the input windings and the body and between the output windings and the body via the intermediate metal part shall consist of **double** or **reinforced insulation**. The insulation between the intermediate metal part and the input or output windings shall in both cases consist of at least **basic insulation**.

NOTE – An intermediate metal part which is separated from one of the input or output windings by double or reinforced insulation is considered as being connected to the other winding.

19.1.3 For **class I transformers**, the insulation between the input and output windings may consist of **basic insulation** plus **protective screening** instead of **double** or **reinforced insulation**, provided the following conditions are complied with:

- the insulation between the input winding and the **protective screen** shall comply with the requirements for **basic insulation** (rated for the input voltage);
- the insulation between the **protective screen** and the output winding shall comply with the requirements for **basic insulation** (rated for the output voltage);
- the **protective screen shall**, unless otherwise specified, consist of a metal foil or of a wire wound screen extending at least to the full width of one of the windings adjacent to the screen; a wire wound screen shall be wound tight without space between the turns;
- the lead-out wire of the protective screen shall have a cross-section at least corresponding to the rated current of the overload device to ensure that, if a breakdown of insulation should occur, the overload device will open the circuit before the lead-out is destroyed;
- the lead-out wire shall be soldered to the protective screen or fixed in an equally reliable manner.

NOTE – For the purpose of this subclause, the term "windings" does not include internal circuits.

Examples of construction of windings are given in annex M of part 1.

19.1.4 For transformers intended for connection to the mains by means of a plug, the alternative with **basic insulation** plus **protective screening** is not allowed.

Addition:

19.101 **Portable transformers** having a **rated output** not exceeding 630 VA shall be of **class II.**

19.102 There shall be no connection between the output winding and the body or the protective earthing circuit, if any. However, such a connection is allowed for **associated transformers** provided that it is allowed by the relevant equipment standard.

19.103 Transformers shall not be provided with capacitors which electrically connect input and output circuits.

Compliance is checked by inspection.

19.104 The input and output terminals for the connection of external wiring shall be so located that the distance, measured at the point of introduction of the conductor, from input to output clamping units of these terminals is not less than 25 mm. If that distance is achieved by a barrier, this barrier shall be of insulating material and be permanently fixed to the transformer.

Compliance is checked by inspection and by measurement disregarding intermediate metal parts.

20 Components

This clause of part 1 is applicable except as follows:

20.3 *Addition:*

Plugs and socket-outlets on the output side shall comply with IEC 884-2-4 and IEC 906-3.

21 Internal wiring

This clause of part 1 is applicable.

22 Supply connection and other external flexible cable or cords

This clause of part 1 is applicable.

23 Terminals for external conductors

This clause of part 1 is applicable.

24 Provision for protective earthing

This clause of part 1 is applicable.

25 Screw and connection

This clause of part 1 is applicable.

26 Creepage distances, clearances and distances through insulation

This clause of part 1 is applicable except as follows:

Box 1 of table 13, table C.1 and table D.1 is not applicable.

27 Resistance to heat, abnormal heat, fire and tracking

This clause of part 1 is applicable.

28 Resistance to rusting

This clause of part 1 is applicable.

Annexes

The annexes of part 1 are applicable except as follows:

Annex C

Material group II

This annex of part 1 is applicable except as follows:

Box 1 of table C.1 is not applicable.

Annex D

Material group I

This annex of part 1 is applicable except as follows:

Box 1 of table D.1 is not applicable.

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Amendments Issued Since Publication

Amendment No.	Date of Issue	Text Affected

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